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Original Contributions

ANXIETY AND DEPRESSIVE DISORDERS IN PATIENTS PRESENTING WITH CHEST PAIN TO THE EMERGENCY DEPARTMENT: A COMPARISON BETWEEN CARDIAC AND NON-CARDIAC ORIGIN

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□ **Abstract—Objective: The aim of this study was to determine the prevalence of anxiety and depressive disorders in patients presenting with chest pain to the Emergency Department (ED) and determine if there is a relationship between these and cardiac vs. non-cardiac chest pain. Methods: This prospective cross-sectional study was performed in an urban tertiary care hospital between March and October 2005. Consecutive patients presenting with chest pain were enrolled in the study. The prevalence of anxiety and depressive disorders in patients with chest pain were determined by using the Hospital Anxiety and Depression Scale. Results: A total of 324 patients presented to the ED with chest pain during the study period. The mean age of the patients studied was 50.5 ± 14 years; 67% were men and 33% were women. Of the 324 study patients, 194 (59.9%) patients were diagnosed with non-cardiac chest pain, 16 (4.9%) with stable angina, 84 (25.9%) with unstable angina, and 30 (9.3%) with acute myocardial infarction. No statistically significant differences were determined between patients with cardiac and non-cardiac chest pain both for anxiety (40% vs. 38.1%, respectively; $p = 0.737$) and depressive disorders (52.3% vs. 52.1%, respectively; $p = 0.965$). Conclusion: Anxiety and depressive disorders are common among patients presenting with chest pain to the ED. However, the prevalence of anxiety and depressive disorders is similar between patients with chest pain of cardiac and non-cardiac origin. Chest pain should not be attributed to an anxiety or depressive disorder before organic etiologies are excluded. © 2010 Elsevier Inc.**

□ **Keywords—emergency department; chest pain; anxiety disorder; depressive disorder**

INTRODUCTION

Chest pain is one of the most common complaints among patients presenting to the Emergency Department (ED) (1). Of these patients, approximately one-third are diagnosed with acute coronary syndromes (ACS), and the remaining two-thirds with non-cardiac chest pain (2). The patients with non-cardiac chest pain often undergo unnecessary diagnostic procedures and hospitalization, which contributes to increased health care expenditure (3). Studies have shown that non-cardiac chest pain in the emergency setting may be associated with psychiatric disorders, especially panic, anxiety, and depressive disorders (4–9). Studies cite the prevalence of panic disorders among patients with non-specific chest pain ranging from 16% to 43% (4,5,7,8). Similarly, anxiety and depressive disorders among non-specific chest pain patients range from 23% to 57% (6–9). Non-specific chest pain

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associated with panic and depressive disorders contributes to increased utilization of the ED, and anxiety similarly increases health care consumption among patients with a history of myocardial infarction (5,10). Earlier studies focused on the relationship between psychiatric disorders and non-specific chest pain. More recent studies report a high prevalence of panic, anxiety, and depressive disorders among patients with and without coronary artery disease (11–13). Additionally, anxiety and depression are common in acute coronary syndromes (14,15). Depression and anxiety are also related to poor prognosis in coronary artery disease and recurrent cardiac events, even after adjusting other risk factors for mortality. Depression is related to lower mental health, which subsequently impairs quality of life (10,15–19). Additionally, it is also related to symptoms impairing quality of life, like chest pain during anger, palpitation without physical exercise, trembling of hands and voice, and jerking of muscles (13).

Emergency Physicians may commonly attribute non-specific chest pain to anxiety disorders or somatization. Although the relationship between somatization and anxiety and depression should not be disregarded, organic etiologies should primarily be excluded. Furthermore, chest pain may cause anxiety and depression. Anxiety causes chest pain in 15% of patients secondary to hyperventilation (20). This study seeks to determine whether there exists a difference between patients presenting with cardiac and non-cardiac chest pain, and to establish the prevalence of anxiety and depression disorders in patients presenting with chest pain to the ED.

MATERIALS AND METHODS

Study Design

This prospective cross-sectional study was performed in an urban tertiary care hospital (annual census of approximately 50,000 adult visits) between March 2005 and October 2005. The study was approved by the local ethics committee.

Patient Selection

All patients over 18 years of age who consecutively presented to the ED with a chief complaint of non-traumatic chest pain were enrolled into the study. The ED residents collected the data. The study form included demographic features; comorbid diseases such as diabetes mellitus, hypertension, and history of coronary artery disease; and the Hospital Anxiety and Depression Scale (HADS). The HAD Scale was filled out by the patients themselves.

Patients who had unstable vital signs and altered mental status, and the illiterate who could not give informed consent were excluded from the study. Patients with ST-segment elevation myocardial infarction were also excluded from the study because these patients were immediately transported to the catheter laboratory for percutaneous coronary intervention.

Diagnosis

Chest pain defined as heaviness or a squeezing sensation over the anterior chest wall by the patient was accepted as cardiac, and dyspnea, palpitation, syncope, nausea, vomiting, and sweating as anginal equivalents.

Non-cardiac chest pain was defined according to the American College of Cardiology/American Heart Association (ACC/AHA) guidelines: pleuritic pain (i.e., sharp or knife-like pain brought on by respiratory movements or cough); primary or sole location of discomfort in the middle or lower abdominal region; pain that may be localized at the tip of one finger, particularly over the left ventricular (LV) apex; pain reproduced with movement or palpation of the chest wall or arms; constant pain that lasts for many hours or very brief episodes of pain that last a few seconds or less; and pain that radiates into the lower extremities (21).

Acute coronary syndrome was defined as acute myocardial infarction in accordance with the World Health Organization criteria and the Consensus Document of the Joint European Society of Cardiology/American College of Cardiology Committee for the Redefinition of Myocardial Infarction or unstable angina (UA) that was classified according to the ACC/AHA guidelines (21,22). Additionally, only patients with typical chest pain were classified as UA. Stable angina (SA) was defined as exertional typical chest pain that resolves with rest. Patients with chest pain were followed by serial electrocardiograms and cardiac enzymes for 6 h after symptom onset, as is routine in our clinical practice.

Cardiac troponin T was measured by electrochemiluminescence method with a Roche Elecsys 2010 analyzer (Roche Diagnostics, Basel, Switzerland). Levels > 0.1 ng/mL for TnT were considered increased.

Diagnosis of Anxiety and Depression

Anxiety and depression disorders were detected by using the Hospital Anxiety and Depression Scale, which had been validated in Turkey (23). The HADS is a reliable and handy tool for assessing anxiety and depression in medical patients (24). It was also validated in non-specific chest pain patients by Kuijpers et al. (25). The HADS

consists of two subscales, one evaluating depression and the other anxiety. The score of subscales ranges from 0 to 21. There are different cutoff points suggested for anxiety and depression in the literature. Bjelland et al. suggested a cutoff score of ≥ 8 for both anxiety and depression (24). Kuipers et al. suggested a cutoff value of 4/5 for depression and 8/9 for anxiety (25). However, this could cause an over-estimation both for anxiety and depressive disorders. So we accepted ≥ 10 as the cutoff score for anxiety subscale, as this has previously been verified for a Turkish population, and ≥ 7 for the depression subscale (23, 26).

Statistical Analysis

Data were analyzed using the SPSS 10.0 (Statistical Package for Social Science; SPSS Inc., Chicago, IL) for Windows. When we accepted an anxiety and depression prevalence of 40% in patients with acute myocardial infarction (AMI), as it was reported in previous studies, and a difference of 15% between the two groups, 0.05 for Type 1 error and 0.10 for Type 2 error (90% power), the needed sample size was 200. The continuous data were presented as mean ± standard deviation, and the categorical data were presented as percentiles. Univariate comparisons between groups were made with non-parametric tests: chi-squared or Mann-Whitney U test for two-group comparisons. Non-parametric comparisons for three or more groups were performed by chi-squared test. A logistic regression analysis also was performed to reveal the independent factors affecting the psychiatric status of patients presenting with chest pain to the ED. A two-sided p value < 0.05 was considered significant.

RESULTS

A total of 324 patients who presented to the ED with chest pain were enrolled in the study. Among these, one patient's anxiety subscale was omitted because it was incomplete. Furthermore, there was missing information in 13 patients' demographic features. The study subjects had a mean age of 50.5 ± 14 years. Of these, 67% were men and 33% were women. There were 42 (13%) diabetic patients, 109 (33.6%) patients with a history of hypertension, and 107 (33%) with a history of coronary artery disease (CAD). Of the 324 study patients, 194 (59.59%) patients were diagnosed with non-cardiac chest pain, 16 (4.9%) with SA, 84 (25.9%) with UA, and 30 (9.3%) with AMI. The demographic features of the study cohort are displayed in Table 1.

Table 1. Demographic Features of Study Population

Variables	n (324)	%
Male	217	67
Female	107	33
Diabetes mellitus	42	13
Hypertension	109	33.6
History of CAD	107	33
Tobacco use	106	32.7
Non-cardiac chest pain	194	59.9
SA	16	4.9
UA	84	25.9
AMI	30	9.3

CAD = coronary artery disease; SA = stable angina; UA = unstable angina; AMI = acute myocardial infarction.

The median HADS A (HADS-Anxiety subscale) score of the collective study population was 8 (min–max: 0–20), and 38.9% (n = 126) of the patients studied had a HADS A subscale score of ≥ 10. The median HADS D (HADS-Depression subscale) score of the collective study population was 7 (min–max: 0–19), and 52.2% of all patients had a HADS D subscale score of ≥ 7.

Among patients with non-cardiac chest pain, SA, UA, and AMI, there was statistically no difference for anxiety disorders (38.1% vs. 43.8% vs. 41.7% vs. 33.3%, respectively; $p = 0.833$) or for depressive disorders (52.1% vs. 62.5% vs. 51.2% vs. 50%, respectively; $p = 0.856$). The frequency and median scores of anxiety and depressive disorders among chest pain patients are shown in Table 2. Of the patients studied, 38.1% (95% confidence interval [CI] 31.1%–45.1%; n = 74, median: 8) of patients with non-cardiac origin and 40% (95% CI 31.6%–48.4%; n = 52, median: 8) of patients with cardiac origin had an anxiety disorder ($p = 0.737$). Also, 52.1% (95% CI 45.1%–59.1%; n = 101, median: 7) of patients with non-cardiac chest pain and 52.3% (95% CI 43.7%–60.9%; n = 68, median: 7) of patients with cardiac chest pain had a depressive disorder ($p = 0.965$). There was no statistically significant difference among groups for anxiety and depressive disorders.

The frequency of anxiety and depressive disorders was higher in patients with diabetes mellitus than in those without diabetes ($p = 0.027$). Similarly, women had a higher frequency of anxiety and depressive disorders than men ($p = 0.006$). The frequencies of anxiety and depressive disorders in the other groups based on demographic features are also shown in Table 3. There was a statistically significant difference between cardiac and non-cardiac patients with a history of diabetes mellitus, although not for gender ($p = 0.006$ and $p = 0.343$, respectively). However, after adjusting for these variables, there was no significant difference for either anxiety or depressive disorders.

Furthermore, there was no statistically significant difference between cardiac and non-cardiac patients with a history of CAD for either anxiety (46.7% vs. 38.3%,

Table 2. Anxiety and Depressive Disorders among Non-cardiac and Cardiac Chest Pain Patients

Variable	Anxiety Disorder			Depressive Disorder		
	Median HADS A Score	HADS A ≥ 10 n (%)	*p* Value	Median HADS D Score	HADS D ≥ 7 n (%)	*p* Value
Non-cardiac chest pain	8	74 (38.1)	0.833	7	101 (52.1)	0.856
SA	9	7 (43.8)		8	10 (62.5)	
UA	9	35 (41.7)		7	43 (51.2)	
AMI	7	10 (33.3)		6.5	15 (50)	
Non-cardiac chest pain	8	74 (38.1)	0.737	7	101 (52.1)	0.965
Cardiac chest pain	8	52 (40)		7	68 (52.3)	

HADS A = Hospital Anxiety and Depression Scale-Anxiety Subscale; HADS D = Hospital Anxiety and Depression Scale-Depression Subscale; SA = stable angina pectoris; UA = unstable angina pectoris; AMI = acute myocardial infarction.

respectively; $p = 0.385$) or depressive disorders (58.3% vs. 55.3, respectively; $p = 0.755$).

A logistic regression analysis was performed to reveal independent factors affecting psychiatric status of chest pain patients: gender ($p = 0.016$), diabetes mellitus ($p = 0.04$), and age ($p = 0.02$) were the independent factors for anxiety, but only diabetes mellitus ($p = 0.022$) was the independent factor for depression. The results of logistic regression analysis are shown in Table 4.

DISCUSSION

Physical and mental health are intimately and directly linked to one another. It is likely that poor outcome secondary to cardiovascular disease is related to anxiety and depression. Anxiety and depressive disorders are also common in ACS patients during their hospital stay and 1 month after an acute coronary event. However, psychiatric disorders are common in patients with non-cardiac chest pain as well. Although many authors have studied the psychiatric status of patients with non-cardiac chest pain and acute coronary syndromes separately, there are few studies evaluating psychiatric status of both cardiac and non-cardiac chest pain patients concurrently. In the present study, we have evaluated the prevalence and relationship of psychiatric disorders among both cardiac and non-cardiac chest pain patients.

The scores of HADS A ≥ 10 and HADS D ≥ 7 in our study are inconsistent with previous studies reporting a wide range of anxiety and depressive disorders in non-cardiac chest pain patients (6–9). This wide range may be related to the different scales used to examine the psychiatric status of chest pain patients, and different

Table 3. Anxiety and Depressive Disorders of the Study Population According to their Demographic Features

Variable	Anxiety Disorder			Depressive Disorder		
	Median HADS A Score	HADS A ≥ 10 n (%)	*p* Value	Median HADS D Score	HADS D ≥ 7 n (%)	*p* Value
Age, years (Mean ± SD)	49.5 ± 14.2 vs. 51.1 ± 13.9		0.31	51.4 ± 13.4 vs. 49.5 ± 14.6		0.24
Gender			0.006			0.006
Male	7.5	73 (33.6)		6	73 (33.6)	
Female	9	53 (49.5)		8	53 (49.5)	
Diabetes mellitus			0.027			0.027
Yes	10	23 (54.8)		9	30 (71.4)	
No	8	99 (36.8)		6.5	135 (50.2)	
Hypertension			0.121			0.121
Yes	9	49 (45)		7	60 (55)	
No	8	73 (36)		7	105 (51.7)	
History of CAD			0.300			0.300
Yes	9	46 (43)		8	61 (57)	
No	8	75 (36.9)		7	102 (50.2)	
Tobacco use			0.262			0.262
Yes	7	37 (34.9)		6.5	53 (50)	
No	9	85 (41.5)		7	112 (54.6)	

HADS A = Hospital Anxiety and Depression Scale-Anxiety Subscale; HADS D = Hospital Anxiety and Depression Scale-Depression Subscale; CAD = coronary artery disease; SA = stable angina; UA = unstable angina; AMI = acute myocardial infarction; SD = standard deviation.

Table 4. Logistic Regression Analysis Revealing the Independent Factors Affecting Anxiety and Depression in Chest Pain Patients

	Anxiety		Depression	
Variable	OR (95% CI)	*p* Value	OR (95% CI)	*p* Value
Gender	0.5 (0.3–0.9)	0.016	0.7 (0.4–1.2)	0.18
Diabetes mellitus	2 (1–4.18)	0.04	2.4 (1.13–5)	0.02
Hypertension	1.5 (0.9–2.7)	0.12	0.87 (0.5–1.5)	0.63
Coronary artery disease	1.4 (0.8–2.4)	0.24	1.14 (0.66–1.95)	0.62
Smoking	0.99 (0.6–1.7)	0.98	0.93 (0.56–1.56)	0.80
Typical chest pain	1.14 (0.7–1.92)	0.61	0.8 (0.5–1.3)	0.40
Age	0.97 (0.95–0.99)	0.02	1 (0.98–1.03)	0.33

OR = odds ratio; CI = confidence interval.

cutoff values used in the previous studies. Additionally, there might be a lack of standardization in defining non-cardiac chest pain.

This study also revealed that 40% of patients with cardiac chest pain had a HADS A score of ≥ 10. Studies also differ for the prevalence of anxiety and depressive disorders in acute coronary syndromes. Grace et al. found that over one-third of patients with ACS had an anxiety disorder during hospital admission, but Strik et al. stated a higher prevalence of anxiety disorders among patients 1 month after AMI (10,15). A prevalence of 40% for anxiety disorders may not show dissimilarity from the other studies. However, the prevalence of depressive disorders in our study is 52.3%. Frasure-Smith et al. reported a prevalence of 32% for depressive disorders in AMI patients (18). In another study by Frasure-Smith et al., 68 of 218 AMI patients had a depressive symptomatology, and 35 patients met the criteria for major depression (16). Similar to studies performed by Frasure-Smith et al., Lauzon et al. found 35% of AMI patients to have comorbid depression during hospital admission (27). But the prevalence of depressive disorders in patients with AMI 1 month after the cardiac event was stated as 59.5% by Strik et al., which was higher than the other studies, including the present study (10).

Our study results show that there was no difference between the cardiac and non-cardiac patients for either anxiety or depressive disorders. Furthermore, we found no difference among non-cardiac chest pain, SA, UA, and AMI patients. These findings suggest that psychiatric status is not a useful tool in differentiating non-cardiac and cardiac chest pain.

Another critical question that emerges relates to the difference in prevalence of anxiety and depressive disorders in chest pain patients as it differs from the general ED population. Despite existing analyses of psychiatric disorders in ED subgroups such as elderly patients or frequent users, there has not yet been any analysis of the prevalence of anxiety and depressive disorders among all ED patients. Epidemiological data showed a 12-month prevalence of 18.1% for anxiety and 6.6% for depression (28,29). Additionally, 4–12% of primary care patients have a depressive disorder (30–32). Chest pain patients seeking emergency care seem to have a higher prevalence of psychiatric illness compared with both the general population and primary care patients. Yet, as compared with other chronic illnesses, such as congestive heart failure and chronic pain syndromes, the prevalence of psychiatric illnesses is similar (33–36).

Meta-analyses have shown a two to three times higher prevalence of depression in diabetic patients than the normal population (37,38). In accordance with these meta-analyses, the prevalence of anxiety and depressive disorders was higher in patients with diabetes mellitus in our study.

Women are more susceptible to depression and somatization than men (39–41). Similarly, our study demonstrates a higher prevalence of anxiety and depressive disorders in women than men.

The HAD Scale is usually applied to patients admitted to the hospital with non-psychiatric symptoms and patients admitted to primary care. HADS establishes the risk level and the intensity of anxiety and depressive disorders. It is composed of 14 questions: seven odd-numbered questions determine anxiety and seven even-numbered questions determine depression. Each question has four choices, with a score range of 0 to 3 points (23). HADS is a short and simple psychiatric evaluation tool that can be used in patients admitted to the ED. The Beck Anxiety and Depression Inventory is a more detailed psychiatric evaluation tool composed of two different scales measuring anxiety and depression. The two scales each include 21 questions, totaling 42 questions. The scores of each question vary between 0 and 3 (42). The Beck Anxiety and Depression Inventory is better known and has a more common usage than HADS. However, it is usually used in psychiatric interviews because it takes a longer time and requires more attention.

Limitations

There were some limitations to this study. HADS determines the patients who are at risk for depression or anxiety. The definite prevalence of anxiety and depressive disorders in patients presenting with chest pain to the emergency setting should be determined by a psychiatric interview. Lack of psychiatric interview by an experienced physician could be a limitation. Using different scales in different populations may also cause different results, as suggested by the studies previously cited.

Another issue that is worth emphasizing is that these results cannot be generalized to other patient populations without further study. The results of this study may be affected by the characteristics of the Turkish population. This study did not include the differences in anxiety and depressive disorders that might emerge due to disparities in race and ethnicity. These results should be checked in other populations by further studies.

CONCLUSION

Anxiety and depressive disorders are common among patients presenting with chest pain to the ED. However, the prevalence of anxiety and depressive disorders are similar between patients with chest pain of cardiac and non-cardiac origin. Chest pain should not be attributed to anxiety disorders before organic etiologies are excluded.

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